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TITLE: Role of Schwannomin and Paxillin in Cell Growth Control

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<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> University of Central Florida Orlando, Florida 32826-3252  E-Mail: cfernand@mail.ucf.edu			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
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<b>13. ABSTRACT (Maximum 200 Words)</b> <p>The goal of this work is to determine the physiological effect of schwannomin-paxillin interaction on Schwann cell growth as it pertains to tumor formation in Neurofibromatosis type 2. We propose that the schwannomin-paxillin protein complex contributes to the growth arrest of Schwann cells by regulating the internalization dynamics of erbB2/erbB3 receptors following ligand binding. The aims are as follows:</p> <p>Aim 1: To conduct binding and mapping studies to identify a putative direct binding site for erbB receptors on schwannomin.</p> <p>Aim 2: To conduct functional studies to assess the role of schwannomin and paxillin in cytoskeleton reorganization, receptor association and internalization, and proliferation in response to cell stimulation with GGF.</p> <p>Aim 3: To conduct mechanistic studies to identify components of erbB2/erbB3 signaling complexes associated with growth promotion and inhibition by schwannomin.</p> <p>A No Cost Extension was granted due to a delay in acquiring the necessary personnel. We have hired an experienced full-time technician Elizabeth Baldwin and have trained a PhD student, Courtney Thaxton. Work began on the last 2 months of year one on Aim 2 of the study. We have found that effective phosphorylation of schwannomin on serine 518 requires interaction with paxillin and appears to be stimulated by cdc42. GFP-schwannomin serine 518 and paxillin binding mutants have been transfected into Schwann cells. Results indicate that schwannomin specifies the bipolar morphology of Schwann cells. S518A mutants are unipolar whereas the S518D mutants have excessive branching filopodia reminiscent of oligodendrocyte. Removal of paxillin binding domain 1 abolishes the phosphorylation effect on morphology.</p>				
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## **Introduction/Body**

Funds were used in the last 2 months of year 1 due to a delay in personnel hiring. Personnel are now in place and the work will progress as originally proposed. A No Cost Extension has been granted (See Appendix 1).

We are reporting progress made during the last 2 months of year 1 (March & April) by Courtney Thaxton a PhD student and Elizabeth Baldwin, a full time technician and Jared Iacovelli, a senior graduate student.

The progress is listed below.

## **Key Research Accomplishments**

Aim 2.

We have generated and sequenced point mutants at serine 518 to alanine and to serine to glutamic acid in full-length schwannomin and schwannomin lacking one or both paxillin binding domains. We are subcloning merlin mutant cDNAs into the GFP and HC-Red plasmids for protein localization.

We have transfected and imaged (Figure 1) GFP-schwannomin full length and paxillin binding domain mutants with Serine 518 point mutations into primary rat Schwann cells for confocal imaging to assess effects on cytoskeleton organization and morphology. Xpress-tagged schwannomin mutants have been transfected into CHO and RT4 cells with and without active and dominant negative forms of rac for biochemical experiments to assess the effects on serine 518 phosphorylation.

## **Reportable Outcomes**

GFP-schwannomin full length and the S518A and S518 D mutants all localize to the cell periphery. The S518D mutant causes formation of prolific branching filopodia whereas the S518A mutant causes formation of unipolar Schwann cells with a lamellapodia at one pole and filopodia at the opposite pole. The morphologies observed with these mutants are abolished if the paxillin binding domain 1 is deleted from schwannomin, indicating that schwannomin must bind paxillin to target to the plasma membrane to exert the phosphorylation dependent effect on cell shape. Schwann cells transfected with dn rac have a morphology similar to full length schwannomin, suggesting that schwannomin inhibits rac. See Appendix 2.

## **Conclusions**

Preliminary results indicate that phosphorylation of serine 518 is not required for localization of schwannomin to the plasma membrane and filopodia and lamellapodia. This indicates that schwannomin binding to paxillin does not require phosphorylation of serine 518 by Pak, a rac-activated serine/threonine kinase. It suggests that schwannomin firsts binds paxillin and targets to the membrane where local activation of p21 activated kinase by cdc42 or rac stimulates phosphorylation of serine 518 on schwannomin and the ensuing change in morphology.

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE <b>S</b>	PAGE OF PAGES <b>1   2</b>
2. AMENDMENT/MODIFICATION NO. <b>P00003</b>	3. EFFECTIVE DATE <b>04-May-2004</b>	4. REQUISITION/PURCHASE REQ. NO. <b>W23RYX-3046-N610</b>	5. PROJECT NO. (if applicable)		
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8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code) <b>UNIVERSITY OF CENTRAL FLORIDA 12443 RESEARCH PARKWAY SUITE 20/ ORLANDO FL 32826-3252</b>			9A. AMENDMENT OF SOLICITATION NO.		
			9B. DATED (SEE ITEM 11)		
			<input checked="" type="checkbox"/> 10A. MOD. OF CONTRACT/ORDER NO. <b>DAMD17-03-1-0211</b>		
CODE <b>9H673</b>			<input checked="" type="checkbox"/> 10B. DATED (SEE ITEM 13) <b>22-Apr-2003</b>		
FACILITY CODE					
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>					
<input type="checkbox"/> The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required)					
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.					
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).					
<input checked="" type="checkbox"/> C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: <b>USAMRAA General Terms and Conditions</b>					
D. OTHER (Specify type of modification and authority)					
E. IMPORTANT: Contractor <input checked="" type="checkbox"/> is not. <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) <b>No Cost Extension</b>					
Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) <b>JOSEPH S. LITTLE / CONTRACTING OFFICER</b> TEL: 301 619 2546 EMAIL: joseph.little@us.army.mil		
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY <i>Joseph S. Little</i> (Signature of Contracting Officer)		16C. DATE SIGNED <b>10-May-2004</b>	

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## SECTION SF 30 BLOCK 14 CONTINUATION PAGE

## SUMMARY OF CHANGES

## SECTION 00010 - SOLICITATION CONTRACT FORM

## CLIN 0001

The CLIN extended description has changed from TITLE: Role of Schwannomin and Paxillin in Cell Growth Control" PRINCIPAL INVESTIGATOR: Dr. Cristina Fernandez-Valle PERIOD OF PERFORMANCE: 28 April 2003 - 27 May 2007 (Research ends 27 Apr 2007) to TITLE: Role of Schwannomin and Paxillin in Cell Growth Control" PRINCIPAL INVESTIGATOR: Dr. Cristina Fernandez-Valle PERIOD OF PERFORMANCE: 28 April 2003 - 27 May 2008 (Research ends 27 Apr 2008).

## DELIVERIES AND PERFORMANCE

The following Delivery Schedule item for CLIN 0001 has been changed from:

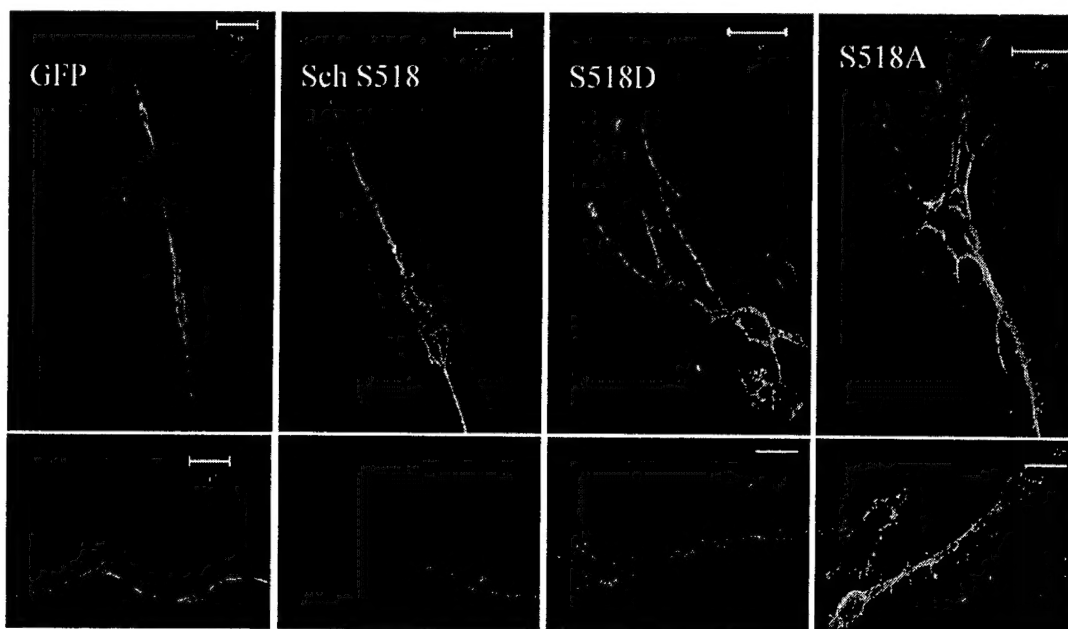
DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
POP 28-APR-2003 TO 27-MAY-2007	N/A	USA MED RESEARCH AND MATERIEL COM CDMRP 1053 PATCHEL STREET FORT DETRICK MD 21702-5012 FOB: Destination	W23RYX

To:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
POP 28-APR-2003 TO 27-MAY-2008	N/A	USA MED RESEARCH AND MATERIEL COM CDMRP 1053 PATCHEL STREET FORT DETRICK MD 21702-5012 FOB: Destination	W23RYX

(End of Summary of Changes)

### Transient Transfection of GFP-Sch S518 Mutants Into Schwann Cells.



GFP expressing  
SCs have  
bipolar filopodia.



S518D  
expressing SCs  
have multiple  
branching  
filopodia.



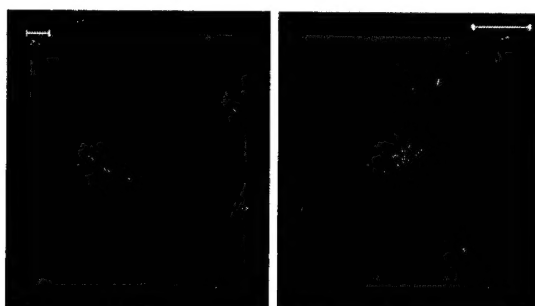
S518 expressing  
SCs have long  
bipolar filopodia  
with many  
microvilli.



S518A expressing  
SCs are unipolar  
with a single  
filopodia and  
lamellapodia at  
opposing poles.

SCs were plated on laminin (25mg/mL) and were transiently transfected with 250ng of GFP alone and GFP Sch mutant cDNA plasmids for 4 hr. Cells were fixed, stained with Phalloidin (Alexa 633 Phalloidin, Molecular Probes) and were mounted 36 hours post-transfection. GFP Sch point mutations were constructed using a site directed mutagenesis (Stratagene Quick Change) on GFP Sch.

### Transient Transfection of GFP-Sch DPBD1 With S518A or S518D



Deletion of PBD1 abolishes the phosphorylation dependent change in morphology. Transfected SCs have a bipolar morphology and resemble SCs transfected with GFP alone (see above).